

液晶显示模块使用手册

版本: 1.1



型号 : CA24064B 系列

选 配 件 说 明				
液晶片	常温（0～50 ）		宽温（-20～+70 ）	
	超宽温（-30～+85 ）			
	黄绿模	蓝模	灰模	黑白模
背 光	LED 白光 EL 蓝光	LED 绿光 CCFL	LED 蓝光	EL 白光
负压电路	板载负压	不带负压		
EL 逆变器	配备	板载	不配备	
CCF 逆变	配备	不配备		

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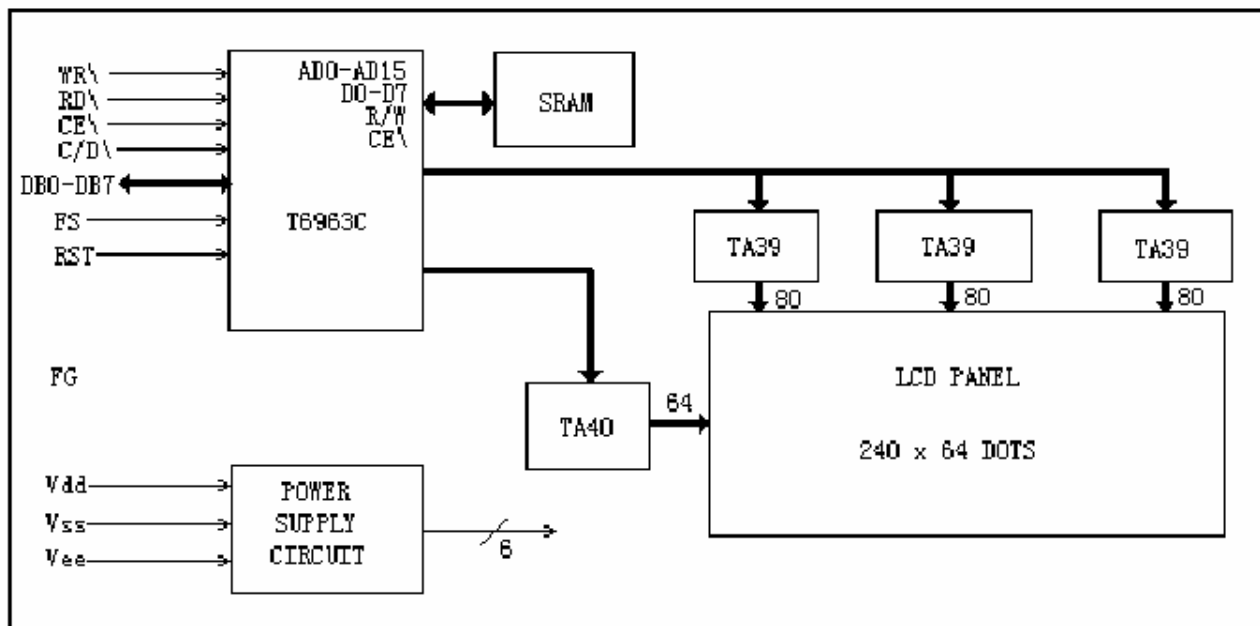
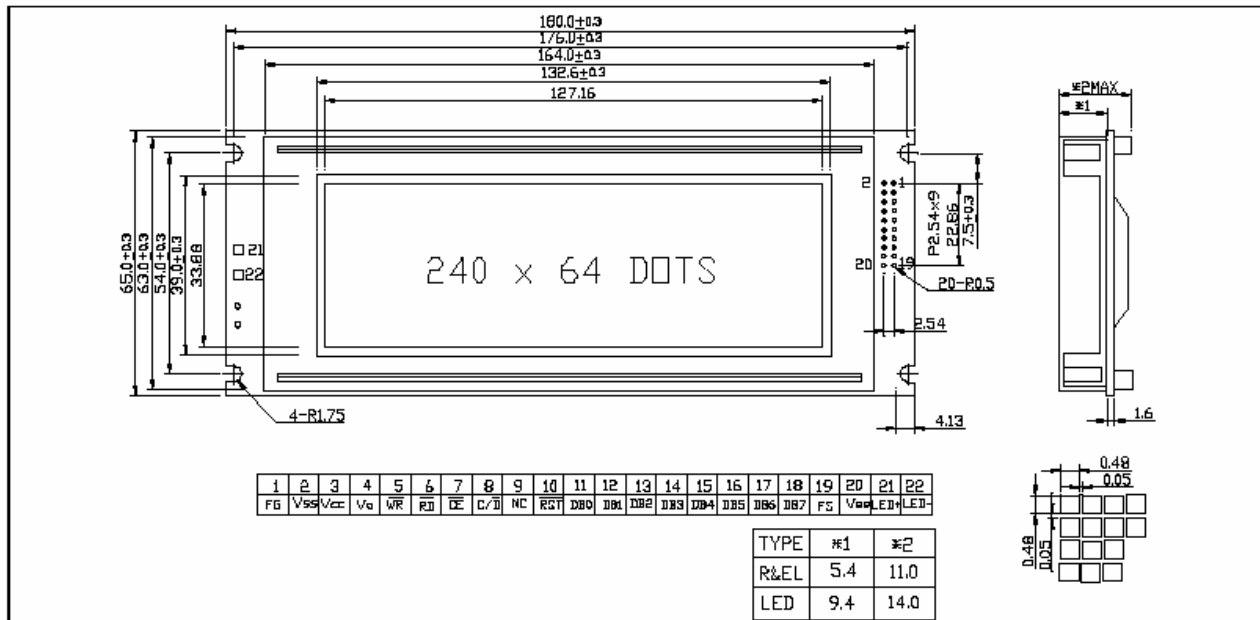
传真 : 0755-27890716

特性：

显示内容：240 × 64 点

驱动方式：1/64Duty

可供型号：STN（黄绿模、灰模、蓝模）；全透型、反射型，EL 背光/100V AC，400Hz；
LED 背光/4.2V；CCFL 背光。

外形尺寸图：

极限参数:

名称	符号	测试条件	标准值		单位
			最小值	最大值	
电源电压	VDD-VSS	Ta=25	0	6	V
LCD 驱动电压	VDD-V0		0	28.0	V
输入电压	VI		0	VDD	V

电参数:

名称		符号	测试条件	标准值			单位
				最小值	典型值	最大值	
电压	逻辑	VDD-VSS	---	4.75	5.0	5.25	V
	LCD	VDD-V0	---	---	15.0	---	V
电流	逻辑	I _{DD}	---	---	12.0	---	mA
	LCD	I _{EE}	---	---	5.0	---	mA
LCD 工作电压 (推荐值)		VDD-V0	0	---	16.0	---	V
			25	---	15.0	---	V
			40	---	14.0	---	V
输入电压	H 高电平	V _{IH}	高电平	0.7 VDD	--	VDD	V
	L 低电平	V _{IL}	低电平	0	--	0.3VDD	V

接口引脚:**带 T6963 控制器接口**

引脚	符号	电平	说明
1	FG	0V	外框接地
2	GND(VSS)	0V	接地
3	VCC(VDD)	5.0V	电源正
4	V0	可调	LCD 驱动电压(对比度调节)
5	WR	L	写信号
6	RD	L	读信号
7	CE(CS)	L	片使能信号
8	C/D(RI)	H/L	指令数据转换(H: 指令; L: 数据)
9	NC	-	空
10	RST	L	复位信号
11	DB0	H/L	数据位 0
12	DB1	H/L	数据位 1
13	DB2	H/L	数据位 2
14	DB3	H/L	数据位 3
15	DB4	H/L	数据位 4
16	DB5	H/L	数据位 5
17	DB6	H/L	数据位 6
18	DB7	H/L	数据位 7
19	FS	H/L	字体选择(L: 8×8; H: 6×8)
20	VEE	-15V	板载负压输出
21	BLA	5V	背光控制脚
22	BLK	0V	背光控制脚

注意：**1、BLA（背光控制脚）：**

在使用 LED 型背光时，作为 LED 背光电源正，板载降压电阻，可直接供给 5V。第 20 脚和第 31 脚同样功能，在带控制器接口中，LED 背光的负极被接到 GND（地）。

在使用 EL 背光和板载 EL 驱动器时，该脚则作为 EL 驱动控制脚，高电平有效。

在使用 EL 背光但外挂 EL 驱动器时，驱动电压则应由第 31, 32 脚输入或直接接于 EL 背光片引线端上。

2、BLK（背光负）

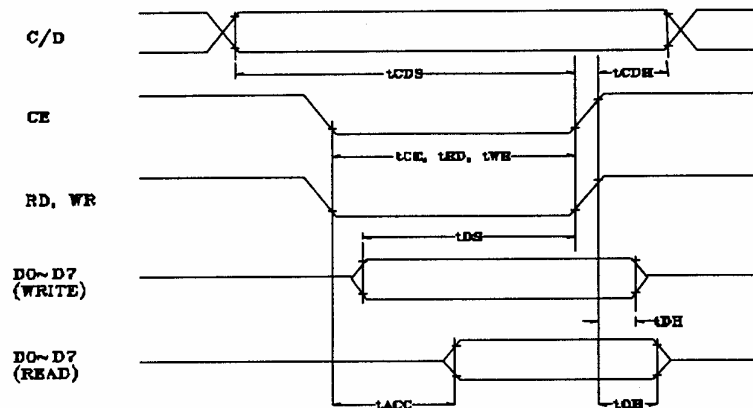
一般只在不带控制器时使用，作为背光低电压输入端（接地），当使用 EL 背光并且外挂驱动器时可作为 EL 驱动电压输入端。

3、VOUT（板载负压输出）

板载负压输出端，输出-12—20V 负电压，以供驱动 LCD 使用，和 V0 间接可变电阻（4.7K—20K）以调节对比度。

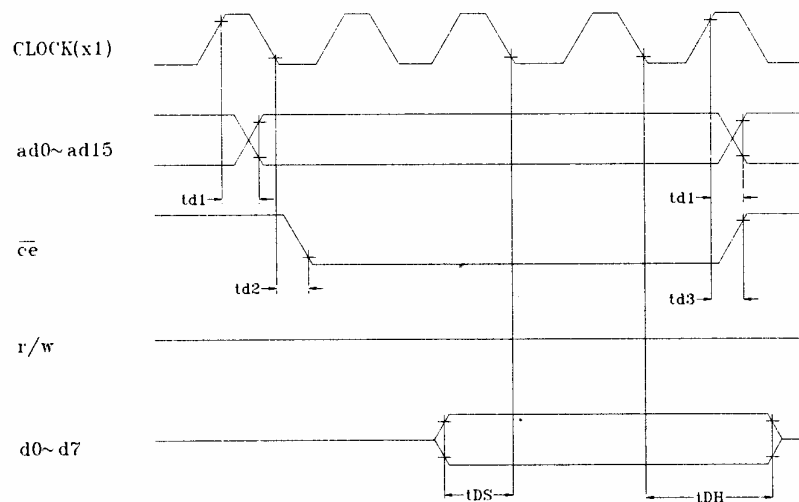
AC characteristics ($V_{dd}=5V \pm 10\%$, $V_{ss}=0V$ $T_a=0\sim 50^\circ C$)

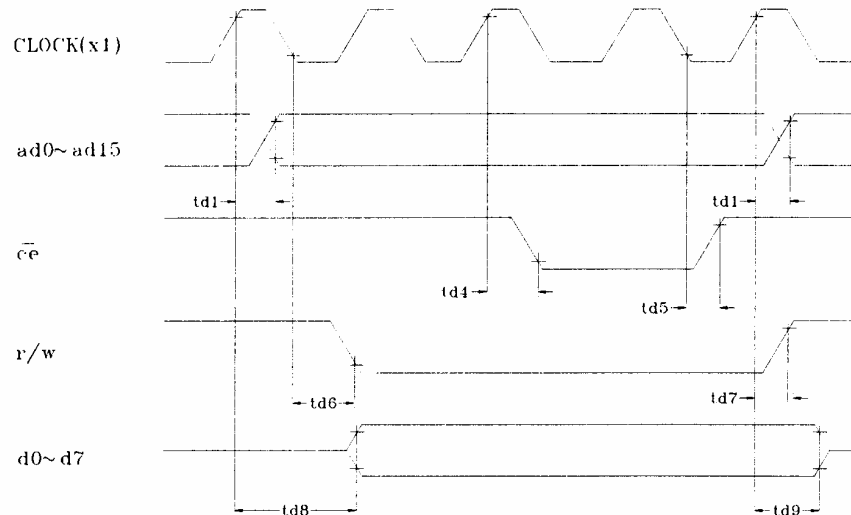
Bus Timing



Signal	Symbol	Test Condition	Min.	Max.	Unit
C/D Set Up Time	T_{cds}		100	--	ns
C/D Hold Time	T_{cdh}		10	--	
CE, RD, WR Pulse Width	T_{ce}, T_{rd}, T_{wr}		80	--	
Data Set Up Time	T_{ds}		80	--	
Data Hold Time	T_{dh}		40	--	
Access Time	T_{acc}		--	150	
Output Hold Time	T_{oh}		10	50	

External RAM Read Mode



External RAM Write Mode

Signal	Symbol	Test Condition	Min.	Max.	Unit
Address Delay Time	td1		--	250	ns
ce Fall Delay Time(Read)	td2		--	180	
ce Rise Delay Time(Read)	td3		--	180	
Data Set Up Time	tDS		0	--	
Data Hold Time	tDH		30	--	
ce Fall Delay Time(Write)	td4		--	200	
ce Fall Delay Time(Write)	td5		--	200	
r/w Fall Delay Time	td6		--	180	
r/w Rise Delay Time	td7		--	180	
Data Stable Time	td8		--	450	
Data Hold Time	td9		--	200	

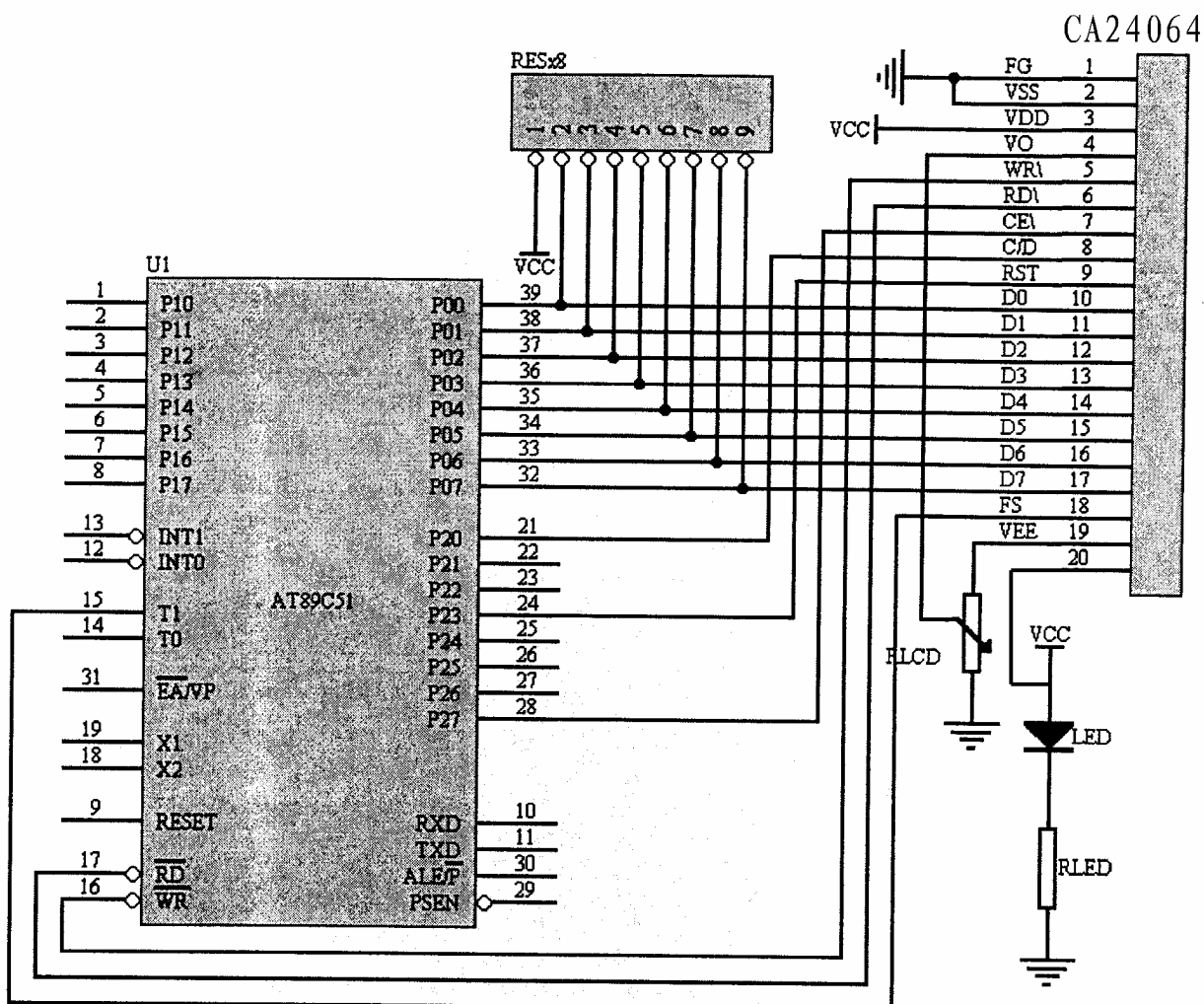
■ COMMAND LIST

COMMAND	CODE	D1	D2	FUNCTION
REGISTER SET	00100001	X address	Y address	Cursor pointer set
	00100010	Data	00H	offset register set
	00100100	Low address	High address	Address pointer set
CONTROL WORD SET	01000000	Low address	High address	Text home address set
	01000001	Columns	Columns	Text area set
	01000010	Low address	High address	Graphic home address set
	01000011	Columns	Columns	Graphic area set
MODE SET	1000x000	--	--	"OR" mode
	1000x001	--	--	"EXOR" mode
	1000x011	--	--	"AND" mode
	1000x100	--	--	"Text attribute" mode
	10000xxx	--	--	Internal CG ROM mode
	10001xxx	--	--	External CG RAM mode
DISPLAY MODE	10010000	--	--	Display off
	1001xx10	--	--	Cursor on, blink off
	1001xx11	--	--	Cursor on, blink on
	100101xx	--	--	Text on, graphic off
	100110xx	--	--	Text off, graphic on
	100111xx	--	--	Text on, graphic on
CURSOR PATTERN	10100000	--	--	1 line cursor
	10100001	--	--	2 line cursor
	10100010	--	--	3 line cursor
	10100011	--	--	4 line cursor

SELECT	10100100	--	--	5 line cursor
	10100101	--	--	6 line cursor
	10100110	--	--	7 line cursor
	10100111	--	--	8 line cursor
DATA AUTO READ/WRITE	10110000	--	--	Data auto write set
	10110001	--	--	Data auto read set
	10110010	--	--	Auto reset
DATA READ/WRITE	11000000	Data	--	Data write and ADP increment
	11000001	--	--	Data read and ADP increment
	11000010	Data	--	Data write and ADP decrement
	11000011	--	--	Data read and ADP decrement
	11000100	Data	--	Data write and ADP nonvariable
	11000101	--	--	Data read and ADP nonvariable
SCREEN PEEK	11100000	--	--	Screen peek
SCREEN COPY	11101000	--	--	Screen copy

COMMAND	CODE	D1	D2	FUNCTION
BIT SET/RESET	11110xxx	--	--	bit reset
	11111xxx	--	--	bit set
	1111x000	--	--	bit0(LSB)
	1111x001	--	--	bit1
	1111x010	--	--	bit2
	1111x011	--	--	bit3
	1111x100	--	--	bit4
	1111x101	--	--	bit5
	1111x110	--	--	bit6
	1111x111	--	--	bit7(MSB)

连接图：



程序举例：

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;          CA24064 测试程序
;*****
;* Support telephone: 0755-26927179,26927178 (SHENZHEN SUNSON)      *
;* Support fax :0755-26920020   Support E-mail:qinrjun@21cn.com      *
;* Create by :刘俊(liujun)                                           *
;*****
;连线表: CPU=89C52      接口顺序以此为淮
;C/D=P2.0      R/W=P2.1      FS=P3.7      CE=P2.7
;FOSC=12MHz      D0-D7=P0.0-P0.7      /RSET=/(CPU RSET)
;*****
;-----
;          PORTD      EQU      0000H      ;模块数据口地址(A15=0.A8=0)
;          PORTC      EQU      0100H      ;模块命令口地址(A15=0.A8=1)
;          FS          BIT      P3.5
;          KEY         BIT      P3.4
;-----
;
;          ORG      0000H
;          LJMP     MAIN
;          ORG      0030H
MAIN:
;          MOV      SP,#60H
;          CLR      FS
;          LCALL    DEL_10MS
;          LCALL    LCD_INT
NEXT:
;          LCALL    CLEAR
;          MOV      DPTR,#BMP_DEMO
;          LCALL    SCREEN
;          LCALL    DEL_3S
;          AJMP     MAIN
DEL_3S:
;          MOV      R7,#10D
DEL2:
;          MOV      R6,#200D
DEL1:
;          MOV      R5,#200D
DEL0:
;          JB      KEY,DEGO
;          LJMP     RKEY
DEGO:
;          DJNZ     R5,DEL0
;          DJNZ     R6,DEL1
;          DJNZ     R7,DEL2
;          RET
RKEY:
;          LCALL    DEL_10MS
;          JB      KEY,DEGO
HERR:
;          JNB     KEY,HERR
;          LCALL    DEL_10MS
;          JNB     KEY,HERR
;          RET
;
;          MOV      35H,#00H
;          MOV      TH0,#00H
;          MOV      TL0,#00H
;          MOV      TMOD,#01H
;          MOV      IE,#82H
;          SETB     TR0
CPUD:
;          ORL      PCON,#01H
;          NOP
;          MOV      A,35H

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        CJNE A,#10D,CPUD
        CLR TR0
        RET
DEL_10MS:
        MOV R6,#10
DL2:
        MOV R7,#200
DL1:
        NOP
        NOP
        NOP
        DJNZ R7,DL1
        DJNZ R6,DL2
        RET
WD2:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        MOV     A,DPL
        LCALL   WD1
        MOV     A,DPH
        LCALL   WD1
        POP     ACC
        POP     DPH
        POP     DPL
        RET
WD1:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        PUSH    ACC
        LCALL   CH_STA1
        POP     ACC
        MOV     DPTR,#PORTD
        MOVBX   @DPTR,A
        POP     ACC
        POP     DPH
        POP     DPL
        RET
AWD:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        PUSH    ACC
        LCALL   CH_STA3
        POP     ACC
        MOV     DPTR,#PORTD
        MOVBX   @DPTR,A
        POP     ACC
        POP     DPH
        POP     DPL
        RET
WC:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        PUSH    ACC
        LCALL   CH_STA1
        POP     ACC
        MOV     DPTR,#PORTC

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        MOVX    @DPTR,A
        POP     ACC
        POP     DPH
        POP     DPL
        RET

CH_STA1:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        MOV     DPTR,#PORTC

CH_1:
        MOVX    A,@DPTR
        ANL     A,#03H
        CJNE    A,#03H,CH_1
        POP     ACC
        POP     DPH
        POP     DPL
        RET

CH_STA3:
        PUSH    DPL
        PUSH    DPH
        PUSH    ACC
        MOV     DPTR,#PORTC

CH_3:
        MOVX    A,@DPTR
        ANL     A,#08H
        CJNE    A,#08H,CH_3
        POP     ACC
        POP     DPH
        POP     DPL
        RET

LCD_INT:
        MOV     DPTR,#00H
        LCALL   WD2
        MOV     A,#42H
        LCALL   WC
        MOV     DPTR,#001EH
        LCALL   WD2
        MOV     A,#43H
        LCALL   WC
        MOV     A,#80h
        LCALL   WC
        MOV     A,#98H
        LCALL   WC
        RET

SCREEN:
        PUSH    DPL
        PUSH    DPH
        MOV     DPTR,#00H
        LCALL   WD2
        MOV     A,#24H
        LCALL   WC
        MOV     A,#0B0H
        LCALL   WC
        POP     DPH
        POP     DPL
        MOV     R7,#64

GRAPH:
        MOV     R6,#30

GRAPH1:

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DB 000H,000H,001H,0F8H,000H,000H,000H,000H,003H,0FEH,03EH,000H,000H,000H,000H,005H
DB 0A0H,000H,000H,000H,001H,0F0H,000H,000H,000H,000H,00FH,080H,000H,000H,000H
DB 001H,07CH,000H,000H,000H,000H,003H,0FCH,03EH,000H,000H,000H,000H,005H,0A0H,000H
DB 000H,000H,001H,0F0H,000H,000H,000H,000H,00FH,080H,000H,000H,000H,000H,07CH
DB 000H,000H,000H,000H,003H,0F8H,07EH,000H,000H,000H,000H,005H,0A0H,000H,000H,000H
DB 001H,0F0H,000H,070H,000H,000H,000H,00FH,080H,000H,000H,000H,000H,07CH,000H,000H
DB 000H,000H,00FH,0F0H,0FCH,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,001H,0F0H
DB 001H,0FCH,000H,000H,000H,00FH,080H,000H,000H,000H,000H,07CH,000H,000H,000H,000H
DB 01FH,0E1H,0F8H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,003H,0F8H,003H,0FEH
DB 000H,000H,000H,00FH,080H,000H,000H,000H,000H,07FH,0F0H,000H,000H,000H,01FH,0C3H
DB 0F0H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,007H,0F8H,007H,03FH,000H,000H
DB 000H,00FH,080H,000H,000H,000H,000H,07FH,0FEH,000H,000H,000H,03FH,087H,0E0H,000H
DB 000H,000H,000H,005H,0A0H,000H,000H,000H,00FH,0FFH,01EH,07FH,000H,000H,000H,00FH
DB 080H,000H,000H,000H,003H,0FFH,0FFH,000H,000H,000H,03FH,03FH,080H,000H,000H,000H
DB 000H,005H,0A0H,000H,000H,000H,03FH,0F3H,0BCH,0FFH,000H,000H,000H,00FH,080H,000H
DB 000H,000H,007H,0FCH,007H,0C0H,000H,000H,03EH,07FH,000H,000H,000H,000H,000H,005H
DB 0A0H,000H,000H,000H,07FH,0E7H,0F8H,0F8H,000H,000H,000H,00FH,080H,000H,000H,006H
DB 00FH,0F8H,007H,0C0H,000H,000H,01CH,07FH,0C0H,000H,000H,000H,000H,005H,0A0H,000H
DB 000H,001H,0FFH,0CFH,0F1H,0E0H,000H,000H,000H,00FH,080H,000H,000H,007H,01EH,0F8H
DB 007H,0E0H,000H,000H,010H,07FH,0E0H,000H,000H,000H,000H,005H,0A0H,000H,000H,003H
DB 0FFH,0CFH,0E3H,0C0H,000H,000H,000H,00FH,000H,01EH,000H,003H,0B8H,0FEH,007H,0E0H
DB 000H,000H,000H,07FH,0F0H,000H,000H,000H,000H,005H,0A0H,000H,000H,07FH,0FFH,0E7H
DB 0C7H,080H,000H,000H,000H,00FH,000H,01FH,000H,003H,0F0H,0FFH,00FH,0E0H,000H,000H
DB 000H,03FH,0FEH,000H,000H,000H,000H,005H,0A0H,000H,000H,07FH,0FBH,0E7H,0CFH,000H
DB 000H,001H,080H,00FH,000H,00FH,080H,003H,0E1H,0FFH,08FH,0E0H,000H,000H,000H,003H
DB 0FFH,080H,000H,000H,000H,005H,0A0H,000H,000H,03FH,0F3H,0E7H,09EH,000H,000H,001H
DB 080H,00FH,000H,007H,080H,003H,0E7H,0FFH,09FH,0C0H,000H,000H,000H,01FH,0FFH,0C0H
DB 000H,000H,000H,005H,0A0H,000H,000H,01FH,0E3H,0E3H,03CH,000H,000H,003H,080H,00FH
DB 000H,007H,080H,003H,0EFH,0FFH,03FH,080H,000H,000H,000H,07FH,0FFH,0C0H,000H,000H
DB 000H,005H,0A0H,000H,000H,00FH,0C7H,0C0H,07CH,000H,000H,003H,0C0H,00FH,000H,007H
DB 080H,003H,0FFH,0FEH,03FH,000H,000H,000H,003H,0FFH,0FFH,0E0H,000H,000H,000H,005H
DB 0A0H,000H,000H,007H,007H,0C0H,07CH,000H,000H,003H,0C0H,00FH,000H,007H,080H,003H
DB 0E7H,0FCH,07EH,000H,000H,000H,00FH,0F8H,0FFH,0E0H,000H,000H,000H,005H,0A0H,000H
DB 000H,000H,00FH,080H,0F8H,0C0H,000H,003H,0E0H,00FH,000H,007H,080H,003H,0E1H,0FCH
DB 07CH,000H,000H,000H,03FH,0E0H,079H,080H,000H,000H,000H,005H,0A0H,000H,000H,000H
DB 01FH,081H,0F8H,0F0H,000H,003H,0E0H,00FH,000H,007H,000H,001H,0E3H,0F2H,0FCH,000H
DB 000H,000H,07FH,080H,078H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,01FH,001H
DB 0F0H,078H,000H,001H,0E0H,00FH,000H,027H,000H,001H,0EFH,0F3H,0F8H,000H,000H,000H
DB 0FFH,000H,078H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,03FH,003H,0F0H,0FCH
DB 000H,001H,0F0H,00FH,0FFH,0F7H,000H,001H,0FFH,0FFH,0F0H,000H,000H,000H,0FEH,000H
DB 078H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,0FFH,003H,0FFH,0FEH,000H,001H
DB 0F0H,01FH,0FFH,0FFH,000H,000H,0FFH,0FFH,0E0H,000H,000H,000H,0F8H,000H,078H,000H
DB 000H,000H,000H,005H,0A0H,000H,000H,001H,0FBH,007H,0FFH,0FFH,000H,001H,0F0H,0FFH
DB 0FFH,0FFH,000H,000H,0FFH,0FFH,0E0H,000H,000H,000H,0E0H,000H,078H,000H,000H,000H
DB 000H,005H,0A0H,000H,000H,000H,0FBH,007H,0FFH,0FFH,000H,001H,0FFH,0FFH,0FFH,0FFH
DB 000H,000H,0FFH,0FFH,0F0H,000H,000H,000H,0E0H,000H,078H,000H,000H,000H,000H,005H
DB 0A0H,000H,000H,000H,0F3H,007H,0FCH,01FH,000H,001H,0FFH,0FFH,000H,07FH,000H,000H
DB 07FH,0FCH,030H,000H,000H,000H,0E0H,000H,078H,000H,000H,000H,000H,005H,0A0H,000H
DB 000H,000H,0E3H,007H,0F0H,00FH,000H,001H,0FFH,0F3H,000H,01FH,000H,000H,07FH,0F0H
DB 000H,000H,000H,000H,070H,000H,078H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H
DB 0E3H,007H,0C0H,007H,000H,003H,0FFH,081H,000H,01EH,000H,000H,03DH,0F0H,000H,000H
DB 000H,000H,030H,000H,0F8H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,003H,003H
DB 080H,006H,000H,007H,0FEH,000H,000H,01EH,000H,000H,000H,0F0H,000H,000H,000H,000H
DB 01CH,000H,0F0H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,003H,000H,000H,000H
DB 000H,003H,0F8H,000H,000H,01EH,000H,000H,000H,0F0H,000H,000H,000H,000H,00FH,000H
DB 0F0H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,003H,000H,000H,000H,000H,003H
DB 0F0H,000H,000H,01CH,000H,000H,000H,07FH,0FEH,000H,000H,000H,007H,0E1H,0F0H,000H
DB 000H,000H,000H,005H,0A0H,000H,000H,000H,003H,080H,000H,000H,000H,001H,0E0H,000H
DB 000H,008H,000H,000H,000H,03FH,0FFH,080H,000H,000H,003H,0FFH,0E0H,000H,000H,000H
DB 000H,005H,0A0H,000H,000H,000H,001H,080H,000H,000H,000H,000H,000H,000H,000H,000H

DB 000H,000H,000H,01FH,0FFH,080H,000H,000H,000H,0FFH,0E0H,000H,000H,000H,000H,005H
DB 0A0H,000H,000H,000H,001H,080H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,007H,0FFH,000H,000H,000H,000H,07FH,0C0H,000H,000H,000H,000H,005H,0A0H,000H
DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,01FH,0C0H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H
DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
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DB 000H,000H,000H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,005H,0A0H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,005H,0A0H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
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DB 0A0H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
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DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,005H,0BFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH
DB 0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH
DB 0FFH,0FFH,0FFH,0FDH,080H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H,000H
DB 000H,001H,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH
DB 0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH

END

附录 1：编码规则

CA 240128 A – S Y H N - L1 C 2C

- 松山电子科技有限公司
- 像素点数
- 模块系列（A--Z）
- 玻璃（LCD）片类型
- T1：TN 型，6：00 CLOCK T2：TN 型，12：00 CLOCK
- S：STN H：HSTN F：FSTN D：DSTN
- 玻璃片颜色
- G：灰模 B：蓝模 Y：黄绿模 K：黑白模 Z：其他
- 玻璃片透明度
- H：半透 A：全透 Y：反射 Z：其他
- 温度范围
- N：常温 W：宽温 S：超宽温 Z：其他
- 背光类型
- N：无背光 S：LED 侧光 L1：LED 黄绿底背光 L2：LED 白色底背光
- E1：EL 蓝光 E2：EL 绿光 E3：EL 蓝绿光 C：CCFL 背光
- 连接方式
- A：导电胶条 B：导电纸 C：导电胶&导电纸 D：金属脚 Z：其他
- 其他（附加项 1-9，N or C）
- 1-9：流水号 N：不带控制器 C：板载控制器

附录 2：各种背光电参数

序号	类型	工作电压	电流	备注
1	LED 黄绿侧光	4.2V	200mA	
2	LED 黄绿底光	4.2V	350mA	
3	LED 白色侧光	3.0V	300mA	
4	EL 黄光	110VAC	65mA	需逆变器
5	EL 蓝光	110VAC	65mA	需逆变器
6	CCFL	逆变器 5V	400mA	需逆变器

注：以上参数仅作参考，不同型号的背光会有所不同。

附录 3：注意事项

十分感谢您购买我公司的产品，在使用前请您首先仔细阅读以下注意事项，以免给您造成不必要的损失，您在使用过程中遇到困难时，请拨打我们的服务电话，我们将尽力为您提供服务和帮助。

1．处理保护膜

在装好的模块成品表面贴有一层保护膜，以防在装配时沾污显示表面，在整机装配结束前不得撕去，以免弄脏或损坏表面。

2．加装衬垫

在模块和前面板之间最好加装一块约 0.1 毫米左右的衬垫。面板还应保持平整，以免在装配后产生扭曲，并可提高其抗振性能。

3．严防静电

模块中的控制、驱动电压是很低、微功耗的 CMOS 电路，极易被静电击穿，静电击穿是一种不可修复的损坏，而人体有时会产生高达几十伏或上百伏的静电，所以，在操作、装配以及使用中都应极其小心，严防静电。为此：

- （1）不要用手随意去摸外引线、电路板上的电路及金属框。
- （2）如必须直接接触时，应使人体与模块保持在同一电位，或使人体良好接地。
- （3）焊接使用的烙铁及装配使用的电动工具必须良好接地，没有漏电。
- （4）不得使用真空吸尘器进行清洁处理，因为它会产生很强的静电。
- （5）空气干燥也会产生静电，因此，工作间湿度应在 RH60% 以上。
- （6）取出或放回包装袋或移动位置时，也需小心，防止产生静电。不要随意更换包装或舍弃原包装。

4．装配操作时的注意事项

- （1）模块是经过精心设计组装而成的，请勿随意自行加工、修整。
- （2）金属框爪不得随意扭动、拆卸。
- （3）不要随意修改加工 PCB 板外形、装配孔、线路及其部件。
- （4）不得修改导电胶条。
- （5）不得修改任何内部支架。
- （6）不要碰、摔、折曲、扭动模块。

5．焊接

在焊接外引线时，应按如下规程进行操作。

- （1）烙铁头温度小于 280 度。
- （2）焊接时间不超过 4 秒。
- （3）焊接材料：共晶型、低熔点。
- （4）不要使用酸性助焊剂。
- （5）重复焊接不要超过三次，且每次重复需间隔 5 分钟。

6. 模块的使用与保养

- (1) 模块的外引线决不允许接错，在您想调试液晶模块时，请注意正确接线，尤其是正负电源的接线不能接错，否则可能造成过流、过压烧电路上的芯片等对液晶模块元器件有损的现象。
- (2) 模块在使用时，接入电源及断开电源，必须在正电源稳定接入以后才能输入信号电平。如在电源稳定前或断开后输入信号电平，有可能损坏模块中的 IC 及电路。
- (3) 点阵液晶模块显示时的对比度、视角与温度、驱动电压的关系很大，所以，如果驱动电压过高，不仅会影响显示效果，还会缩短模块的使用寿命。
- (4) 因为液晶材料的物理特性，液晶的对比度会随温度的变化而相应变化，所以，您加的负压也应随温度作相应调整。大致是温度变化 10 度，电压变化 1 伏。为满足这一要求，您可以做一个温度补偿电路，或者安排一个电位器，随温度调整负电压值。
- (5) 不应在规定工作温度范围外使用，并且不应在超过存储极限温度的范围外存储。如果温度低于结晶温度，液晶就会结晶，如果温度过高，液晶将变成各向同性的液晶，破坏分子取向，使器件报废。
- (6) 用力按显示部分，会产生异常显示。这时切断电源，稍待片刻重新上电，即恢复正常。
- (7) 液晶显示器件或模块表面结雾时，不要通电工作，因为这将引起电极化学反应，产生断线。
- (8) 长期用于阳光及强光下时，被遮部分会产生残留现象。

7. 模块的存储

若长期（如几年以上）存储，我们推荐以下方式：

- (1) 装入聚乙稀口袋（最好有防静电涂层）并将口封住
- (2) 在 -10°C --- +35°C 之间存储。
- (3) 放在暗处，避强光。
- (4) 决不能在表面压放任何物品。
- (5) 严格避免在极限温度/湿度条件下存放。

8. 有限责任和保修

如果松山电子科技有限公司和客户没有发生任何协议，松山电子科技有限公司将从发货日期算起一年内依据松山电子科技有限公司液晶显示模块接受标准（按要求提供复印件）更换或修理功能性故障的液晶显示模块。

外观/视觉毛病必须从发货日起 90 天内送返松山电子科技有限公司。日期的确认将根据货运文件。松山电子科技有限公司保证的责任限于上述提及项目的维修和更换，松山电子科技有限公司不对突发性事件负责任。

保修是以上述注意事项未被忽视为先决条件的，典型的违反例子如下：

- (1) 断裂的液晶显示屏玻璃。
- (2) 线路板孔修改或损坏。
- (3) 线路板布线损坏。
- (4) 电路修改，包括元件的增加。
- (5) 线路板随意研磨、雕刻或油漆。
- (6) 焊接或更改玻璃框。

模块维修将基于双方协议下列出给顾客的清单。模块必须与防静电包装和故障详细陈述一起送回。顾客安装的连接器和电缆必须在不破坏线路板孔，线路和引线端条件下全部移去。